IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re: Attorney Docket No. <u>Ramprashad 4</u>

In re application of: <u>Sean Anthony Ramprashad</u>

Serial No.:	<u>10/706,724</u>	Group Art Unit:	<u>2416</u>
Filed:	<u>11-12-2003</u>	Examiner:	<u>Habte Mered</u>
Matter No.:	<u>992.1104</u>	Phone No.:	<u>571-272-6046</u>

For: <u>Media Delivery Using Quality of Service Differentiation Within a Media Stream</u>

<u>DECLARATION UNDER 37 CFR 1.131</u>

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

1.   I am the applicant of the above-identified patent application and the inventor of the subject matter described and claimed therein ("the Invention").

2.   Prior to September 1, 2003, I conceived the Invention.

3.   Prior to September 1, 2003, I prepared an invention disclosure form documenting the Invention for purposes of review by the IP Law department of my employer, Agere Systems (see Exhibit A).

4.   Prior to September 1, 2003, the IP Law department forwarded the invention disclosure form to the law firm of Mendelsohn and Associates for the preparation and filing of a patent application directed to the Invention (see Exhibit B).

5.   Prior to September 1, 2003, I was contacted by Yuri Gruzdkov, a patent attorney at Mendelsohn and Associates, regarding the scheduling of a conference call to discuss the Invention (see Exhibit C).

6.   On September 15, 2003, I had a conference call with Yuri Gruzdkov regarding the drafting of a patent application directed to the Invention (see Exhibit D).

7.   On October 6, 2003, I received from Yuri Gruzdkov a first draft of the patent application directed to the Invention (see Exhibit E).

8.   After October 6, 2003, but no later than October 28, 2003, I reviewed the first draft of the patent application and provided my comments and suggestions to Yuri Gruzdkov (see Exhibit F).

9.   On October 28, 2003, a revised draft was forwarded to Richard Botos, the managing in-house attorney for this matter at Agere Systems, for review and authorization to file (see Exhibit F).

10.   On November 7, 2003, Richard Botos approved the revised draft of the patent application for filing with the U.S. Patent and Trademark Office (see Exhibit G).

11.   The above-identified patent application was filed on November 12, 2003.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Oct 28, 2009
_____
Date

_____
Sean Anthony Ramprashad

AGERE SYSTEMS INVENTION SUBMISSION

This invention submission is being provided to an attorney in order to determine how to protect intellectual property and to facilitate efforts to acquire appropriate protection. Distribution of this invention submission shall be limited to attorneys and persons acting on behalf of Agere to facilitate making such determinations.

Name(s) of Submitters	Telephone No:	Loc/Room	SBU/Org. Title:	HR ID:	E-Mail Address
Sean A. Ramprashad	908 582 6526	2D 556	30003592	4334524	ramprash@agere.com

TITLE: Robust media delivery and automatic adaptation to the channel using layered source coding combined with the Media Access Control

Important Notes: (1) Keep in mind that your submission should be written so it can be understood in 5 to 10 minutes by a generalist. Avoid the use of undefined acronyms and jargon. Keep the language simple. (2) Have any of the above submitter(s) discussed this invention with, or provided an invention submission disclosing this invention to, an attorney other than the recipient of this invention submission? _____ YES __x__ NO

1. Describe the problem your invention solves:

The innovation allows for an efficient way to control and optimize the flow of multimedia traffic using of a joint strategy of layered source coding and the Media Access Control (MAC). This joint strategy (innovation) gives the MAC layer increased degrees of freedom to control the information flow in each multimedia bit-stream. The specific innovations are:

a) The idea of, and means for, enabling the MAC to have non-trivial control over the source transmission bit-rate of each multimedia source by using layered multimedia bit-streams. That is, the MAC has more options than simply to transmit or drop packets. The MAC can now divide the information of a given time segment (i.e. a packet) up into multiple subsets (sub-rates) transmitting or dropping different subsets in different ways. The layered source coder makes this possible.

b) The idea of allowing a single multimedia source to simultaneously use different QoS settings of the MAC. This is done by allowing different subsets (layers) of each multimedia bit-stream to use different Quality of Service (QoS) settings of the MAC. The layered source coder makes this possible.

Specific embodiments of the strategy in 802.11 solves the following problems:

a) It allows the MAC itself to naturally scale the number of multimedia bit-streams the shared channel resource can handle. This is done by giving different subsets of each multimedia bit-stream different transmission priorities. When congestion occurs the less important subsets with less priority are naturally delayed or dropped. When the network is not congested more subsets are naturally transmitted.

b) It provides better multimedia quality since different layers in a multimedia bit-stream can be assigned the specific QoS that better matches their individual requirements. This is particularly important for multimedia bit-streams (in contrast to data) since it is often the case that different subsets of bits show different sensitivities (in terms of the decoded quality) to transmission impairments.

c) It provides better control of multimedia quality in cases where network conditions are constantly changing. For example, it is often better to ensure the more important subsets are transmitted than to drop entire packets of data. Also, when the network can handle transmitting more subsets of the bit-stream this is done naturally with the MAC transmitting more important subsets before less important subsets. This gives a controlled increase in the quality of the decoded multimedia stream. This strategy also balances the quality across all multimedia streams *rather* than

*** Provide the information requested in this box on each page of the submission, as well as drawings, sketches, photographs, etc. ***

Submitter(s) signature(s) and date:

This invention submission has been read and understood by the following two witnesses:

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date

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date

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date

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date

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maintaining quality on some streams at the expense of others. This is what is often done now. For example a system may have a high priority audio stream that dominates the channel resource at the expense of a less important video stream.

d) It simplifies the system design by eliminating the need for signaling between the MAC and higher communication layers, e.g. the MAC does not need to send a signal to the source coder in order to change the source bit-rate.

Background:

Robust media delivery over networks which have a finite shared channel resource, such as the Internet and 802.11 (WLAN), often requires the system to provide differentiated levels of service to different user bit-streams (sources), e.g. highest priority to voice, excellent effort to video, best effort to data, etc. This way the appropriate compromises are made for different types of traffic over the network.

However, even better performance can be seen if the sources themselves (in particular their bit-rates) adapt to the network conditions, e.g. a single video stream may decide make use of highest priority, excellent effort, and best effort simultaneously. Such an option can be of particular advantage with media (voice, video, audio) traffic. The innovation provides an efficient way to implement both these options.

2. **Based on information of which you are already aware, describe:**
   (i) previous attempts to solve the problem your invention solves:
   a. The Adaptive Multi-Rate (AMR) approach of GSM allows the system to properly balance resources of source coding and channel coding overhead. The fgmicrotec "fmM" white paper describes a similar idea to adapt the "flow" in a WLAN network using some feedback on the network performance.
   b. Another approach is Unequal Error Channel Protection (UEP). Here source-streams themselves are each broken down into sub-streams with each sub-stream given the optimal level of channel protection/detection. The latter is useful since source streams for multimedia, e.g. voice and video, do not have a uniform level of sensitivity across the stream to transmission impairments.
   c. There was a proposal I made along with Peter Kroon, Debasis Mitra (Bell Labs) and Allan Weis (Bell Labs) to use an embedded coder in a statistical multiplexer (Stat-Mux) to do adaptive flow control to improve network performance in VoIP. A patent application was filed by Allan Weis and Wonho Yang.
   d. Agere has a customer "SpectraLink" which has a feature allowing the 802.11 MAC to drop packets that have been delayed too much while waiting a successful transmission.

   (ii) The disadvantages of the previous attempts:
   The main disadvantages to the AMR-type approach:
   a. Both approaches require communication between the lower network layers and higher layers to change the source bit-rate produced by source (speech, video, audio etc) coders. This adds both complexity and latency in adaptation to the communication system.
   b. Both approaches require the channel condition to be estimate and they often adapt after estimation is done. If the channel is not stationary, or if the channel changes after estimation, the adaptation may not be relevant.
   c. In both approaches each source stream cannot be further sub-divided into the different levels of quality of service (QoS). The entire contents in a single bit-stream are given the same target QoS.

   The main disadvantages of the UEP-type approach are:
   a. The UEP approach depends on using different forward error correcting codes during a single transmission. This is not part of the 802.11 standard.

   *** Provide the information requested in this box on each page of the submission, as well as drawings, sketches, photographs, etc. ***

   Submitter(s) signature(s) and date: **This invention submission has been read and understood by the following two witnesses:**

   _____   _____
                        date   **date**

   _____   _____
                        date   **date**

   _____

b. UEP using multiple channel codes does not allow differentiated levels of quality in aspects such as transmission latency, throughput etc. In contrast, the MAC can provide such differentiated aspects of quality. UEP mainly provides differentiated levels of random bit-errors and error detection.

The Stat-Mux approach:

a. This does not use a MAC layer and is therefore a different concept. The shared resource in this case is a common finite transmission buffer over a dedicated channel that has a constant transmission rate. This is different from the case where a MAC contends for a shared channel.

The SpectraLink approach:

a. This approach, focused on voice, allows an entire packet to be dropped. This is equivalent to dropping all the information for a given time segment. Our approach is much more general and flexible. We are able to drop only subsets of the information of a given time segment.

b. We can also let different subsets see different QoS (not simply the binary-level QoS which is either to drop or to transmit).

3. Summarize (30 words or less) the new feature(s) of your invention that solve the problem:
The main feature is the efficient combination of a layered source stream with the multiple levels of quality of service (QoS) provided by more advanced MAC layer design, e.g. those described in 802.11e. By using layered coding one can give the MAC layer increased control over the flow of source-streams. As a result the MAC can adapt transmission resources immediately without having to communicate to, or adjust functions of, the higher communication layers. Also, the combination allows a single source stream to be divided into multiple sub-streams thereby taking simultaneous advantage of the different QoS's provided by the MAC. This improves the performance of the overall system.

4. Succinctly describe your invention, referring to drawings, sketches, photographs, etc., in sufficient detail to enable one knowledgeable in the invention's field of technology to understand construction and operation of the invention. Drawings, etc., should show only those features necessary for an understanding of the invention. Describe how/why your invention overcomes the disadvantages noted in 2. (ii) above.

a) The innovation uses a layered (embedded or multi-descriptive) source coder to provide a layered multimedia bit-stream. Layered coding allows the source decoder to independently decode different layers of the source bit-stream without the need for signaling to and from the source encoder. As a result, elements in the network between the source encoder and source decoder are themselves able to change the flow of different layers of the source bit-stream.

b) The MAC now has the ability to access and transmit independently different subsets of each multimedia stream.

c) The use of a layered multimedia stream is then combined with the differentiated levels of QoS that are managed by the MAC. The MAC can provide differentiated levels of QoS through use of known procedures, e.g. the use of different retransmit strategies, the use of different transmission priorities etc. as in 802.11e. These provide QoS differences in terms of quality measures such as throughput, latency (delay), packet loss rates etc.

d) By giving the MAC layer control over the source-streams the source transmission characteristics can be adapted immediately by the MAC, e.g. to change the source transmission bit-rates, the number of streams that can be supported, the maximum delay in transmission etc. This is a natural thing to do since the MAC layer has immediate information on the channel condition and the MAC ultimately controls the flow of each multimedia-stream. There is no need to make explicit estimates of the channel, to signal estimates to higher layers, or do complicated coordination with higher layers.

e) Layered source streams also allow the system to divide a single source stream into multiple sub-streams to give each their required (different) level of service provided by the MAC. This further optimizes performance, i.e. analogous to how UEP provides better quality than Equal Error Protection (EEP) but in this case entirely through the functioning of the MAC itself, not a channel code.

*** Provide the information requested in this box on each page of the submission, as well as drawings, sketches, photographs, etc. ***

Submitter(s) signature(s) and date:	This invention submission has been read and understood by the following two witnesses:
_____ date	_____ date
_____ date	_____ date

ATTORNEY-CLIENT PRIVILEGED DOCUMENT

To give an example:
The source coder produces a layered source stream consisting of multiple layers. The MAC layer would then transmit the layers separately, or in sub-groups, with each group/layer having a different target QoS. This would be done and adapted in an optimal fashion based entirely on the features and information provided in the MAC layer. One thing to do would be to rank the layers depending on their importance. The most important layers could be given the best QoS possible and less important layers are given less stringent levels of QoS. The system can also be set up that the least important layers may even be dropped (not transmitted) as the immediate network resources dictate to ensure that more important layers have a better chance of getting transmitted.

5. Advantages of your invention:

    a. It allows the systems to adapt immediately in the MAC layer based on immediate (current) information, e.g. about retransmissions and congestion in the network etc.

    b. It does not require communication from the MAC to higher network layers thereby simplifying the system design and reducing adaptation latency.

    c. It also enables transmission resources to be allocated optimally among different layers within a *single* source stream. In fact, by doing this the joint performance across all source streams can be improved, e.g. it is often better if the most important layers of all sources are transmitted rather than if some source streams dominate the network at the expense of other sources.

    d. It can be used to design systems that naturally scale either in the number of multimedia streams that access the channel and/or the channel conditions. When the channel can handle providing good QoS to all source layers the amount of source information transmitted (source bit-rate) naturally increases providing better source quality at the receiver. When the network becomes congested the source information naturally decreases allowing the system to scale to accommodate the increased media load.

6. Explain how use of your invention would be detected:
To begin the invention could be present if the following things are noted in a system design.

    a. The use of a layered (embedded or multi-descriptive) source coder is used rather than a multi-rate or fixed-rate source coder

    b. The use of a MAC layer that can provide differentiated levels of QoS (e.g. as in 802.11e).

Beyond this one could detect the invention by seeing how the system reacts in bad channel conditions. If the invention were being used one would note a natural decrease in quality (e.g. SNR) in different decoded media streams as the network became congested (as opposed to dropouts or missing streams). Also, one can look at the system specifications or how the system is marketed. One of these would probably mention some advanced feature for either congestion control, robustness, or scalability. If the above features are present it is quite likely some form of the invention is being used.

Submitter(s) signature(s) and date: **This invention submission has been read and understood by the following two witnesses:**

_____   date   _____   date

_____   date   _____   date

Exhibit B

992.1104

agere systems

Kyshon J. Rivers
Outside Counsel Coordinator
Intellectual Property Law

P.O. Box 614 Berkeley Heights, NJ 07922-0614

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Fax: 908-582-6766 610-712-8514
krivers@agere.com

█████ 2003

Steve Mendelsohn, Esq.
Mendelsohn & Associates, PC
1515 Market Street, Suite 715
Philadelphia, PA 19102

Re: **IDS No.:** 124661 **(CLASS II)**
 Managing Attorney **Telephone No.** **Fax No.**
 Rick Botos (610) 712-8520 (610) 712-8544
 Secretary **Telephone No.**
 Judith Williams-Matthew (610) 712-8525

Dear Steve:

The above-referenced patent submission enclosed with this letter must be filed by █████ 2003 In accordance with Agere's general Instructions for Outside Counsel, previously furnished to you. If, for any reason, you cannot meet the filing date requested, you MUST notify the Managing Attorney (MA) and me, VIA FACSIMILE, as soon as possible.

After the final claims have been drafted and you are therefore in a position to identify the inventors, please send "Request for Case Name/Number" (ATTACHMENT G), VIA FACSIMILE, to me at (610) 712-8544.

This invention has been initially reviewed and determined to have significant potential commercial value. Accordingly, a copy of the proposed application is to be sent to the MA prior to execution of the Declaration and Assignment; all other substantive papers such as amendments, appeal briefs, and the like are also to be sent to the MA prior to filing. The MA will notify you to proceed or contact you to discuss any requested changes, as appropriate. Furthermore, for continuity purposes, it is important that the **same** attorney that prepared the application be assigned to work on its continued prosecution. If otherwise, please advise.

We request that this application be foreign filed EPC designating France, Germany and Great Britain, and nationally in Japan.

If, during the prosecution of an application, you believe that a CPA/CIP, Divisional, Appeal, etc. should be filed, your advice should be presented to the Managing Attorney for concurrence, prior to commencement of any work.

Very truly yours,

Kyshon J. Rivers

Enc.

RECEIVED █████ /03
MENDELSOHN & ASSOC.

CI-II

Exhibit C

From: "Ramprashad, Sean A (Sean)" <ramprash@agere.com>
To: "'Yuri Gruzdkov'" <yuri@mendelip.com>,
    "Ramprashad, Sean A (Sean)"
    <ramprash@agere.com>
Subject: RE: IP Sub. 124661
Date: Tue,█████2003 10:02:59 -0400
X-Mailer: Internet Mail Service (5.5.2653.19)
X-MFData: [v1.0 t0,15195]

Dear Yuri,

If it is ok I'll give you a call tomorrow (Wed) afternoon, caught up in meetings
all of today and tomorrow morning.

When is a good time for you? 3 pm?

Sean

-----Original Message-----
From: Yuri Gruzdkov [mailto:yuri@mendelip.com]
Sent: Monday,█████2003 3:20 PM
To: ramprash@agere.com
Subject: IP Sub. 124661

Sean,

please contact me regarding your invention submission entitled "Robust media delivery
and automatic adaptation..." forwarded to me by Agere. I will be working with you on
the preparation of the corresponding patent application.

Thank you,
--Yuri

_____
Yuri Gruzdkov
Mendelsohn & Associates, P.C.
1515 Market Street, Suite 715
Philadelphia, PA 19102
Tel.   215-557-8544
FAX   215-557-8477

This message is intended only for the designated recipient(s). If you are not a
designated recipient, you may not review, copy or distribute this message. If you
receive this in error, please notify the sender by reply e-mail and delete this message.
Thank you.

Exhibit D

Subject: RE: IP Sub. 124661
Date: Thu, 11 Sep 2003 10:39:09 -0400
X-MS-Has-Attach:
X-MS-TNEF-Correlator:
Thread-Topic: IP Sub. 124661
Thread-Index: AcN3w3674I7KQKVFSqibQqHDowpTTgArtU8g
From: "Ramprashad, Sean A (Sean)" <ramprash@agere.com>
To: "Yuri Gruzdkov" <yuri@mendelip.com>,
      "Ramprashad, Sean A (Sean)" <ramprash@agere.com>
X-MFData: [v1.0 t0,53597]

Hi Yuri,

Great, confirmed. I will be at 908 626 1251 at that time.   9/15 @ 10:30 am.
I will try to get the materials out to you sometime today or
early tomorrow.

Thanks,

Sean

> -----Original Message-----
> From: Yuri Gruzdkov [mailto:yuri@mendelip.com]
> Sent: Wednesday, September 10, 2003 1:47 PM
> To: Ramprashad, Sean A (Sean)
> Subject: RE: IP Sub. 124661
>
>
> Sean,
>
> how about Monday, at 10:30 am?
>
> In addition, it would be helpful if you could forward to me a
> soft copy of
> the disclosure along with other materials, which you deem
> pertinent to our
> discussion.
>
> Thank you,
>
> -Yuri
>
> At 01:25 PM 9/10/2003 -0400, you wrote:
> >Hi Yuri,
> >
> >I back from leave and am free tomorrow or Monday to discuss
> the patent.
> >What time would be good for you?
> >

Exhibit E

To: "Ramprashad, Sean A (Sean)" <ramprash@agere.com>
From: Yuri Gruzdkov <yuri@mendelip.com>
Subject: initial draft
Cc:
Bcc:
Attached: D:\Yuri\992.1104\992_1104 text v02.doc; D:\Yuri\992.1104\992_1104 Scanned Figures
Fig. 1-4.pdf;

Sean,

attached is the initial draft of your patent application for your review. Because this application is
already past due for filing, please try to review the draft at your earliest convenience.

If you could, please acknowledge receipt of this message.

Thank you,
-Yuri

Exhibit F

FAX COVER SHEET

28 October 2003

Page 1 of 21

FROM:	TO:
Yuri Gruzdkov *Yb* yuri@mendelip.com	Rick Botos
COMPANY NAME: Mendelsohn & Associates, P.C.	**COMPANY NAME:** Agere Systems Inc.
PHONE NUMBER: 215-557-8544	**PHONE NUMBER:** 610-712-8520
FAX NUMBER: 215-557-8477	**FAX NUMBER:** 610-712-8544
Our Ref.: 992.1104	**Case Name: Ramprashad 4** **IDS No.: 124661**

MESSAGE

Dear Rick:

I am enclosing a draft of the above-referenced patent application for your review. This draft has been approved for technical accuracy and completeness by the inventor. Please let me know if you believe that any additional changes should be made to the application.

Thank you,
Yuri Gruzdkov

Exhibit G (1/2)

Amy Laudenslager

From: Williams-Matthew, J A (Judith) [jadwilliams@agere.com]
Sent: Friday, November 07, 2003 8:53 AM
To: amy@mendelip.com
Subject: Ramprashad 4

Amy,

Per Rick Botos, you may proceed and there are no changes required.

Judith A. WilliamsMatthew
Agere Systems IP Law
jadwilliams@agere.com
(610) 712–8525 (work)
(610) 712-8544 (fax)
(908) 790-1632 x 28525 (NJ Only)

Exhibit G (2/2)

Subject: RE: filing
Date: Fri, 7 Nov 2003 11:23:40 -0500
X-MS-Has-Attach:
X-MS-TNEF-Correlator:
Thread-Topic: filing
Thread-Index: AcOISqsbFFdHxVyRSZaKcE7aSpBKqQAAMwjw
From: "Ramprashad, Sean A (Sean)" <ramprash@agere.com>
To: "Yuri Gruzdkov" <yuri@mendelip.com>,
     "Ramprashad, Sean A (Sean)" <ramprash@agere.com>
Cc: "amy Laudenslager" <amy@mendelip.com>
X-MFData: [v1.0 t0,61043]

Thanks for your efforts,

Best regards,

Sean

> -----Original Message-----
> From: Yuri Gruzdkov [mailto:yuri@mendelip.com]
> Sent: Friday, November 07, 2003 11:18 AM
> To: Ramprashad, Sean A (Sean)
> Cc: amy Laudenslager
> Subject: filing
>
>
> Sean,
>
> Rick Botos has just approved your application for filing without any
> additional changes to the draft (version 03). Amy
> Laudenslager of our firm
> will contact you with the paperwork.
>
> Please let me know if you have any questions or comments.
>
> Thank you,
> -Yuri
>
>